

REMARKS

Favorable consideration of this Application as presently amended and in light of the following discussion is respectfully requested.

After entry of the foregoing Amendment, Claims 1, 3-22 are pending in the present Application. Claim 2 has been canceled without prejudice or disclaimer. Claims 1, 3, 9, and 19 have been amended. Claims 20-22 are new. Support for the new claims and amendments can be found in the specification and claims, as originally filed. No new matter has been added.

By way of summary, the Official Action presents the following issues: Claim 2 stands objected to under 37 C.F.R. § 1.75 as being substantially duplicate of Claim 1; Claims 1-9 and 19 stand rejected under 35 U.S.C. § 102 as being unpatentable over Shearer, III (U.S. Patent Publication No. 2003/0058826 A1, hereinafter Shearer); Claims 10 and 11 stand rejected under 35 U.S.C. § 103 as being unpatentable over Shearer in view of Haartsen (U.S. Patent No. 6,576,266); Claim 12 stands rejected under 35 U.S.C. § 103 as being unpatentable over Shearer in view of Haartsen and further in view of Chari et al. (U.S. Patent No. 6,704,301, hereinafter Chari); and, Claims 13-18 stand rejected under 35 U.S.C. § 103 as being unpatentable over Shearer in view of Chari.

REJECTION UNDER 37 C.F.R. § 1.75

The Official Action has rejected Claim 2 under 37 C.F.R. § 1.75 as being a substantial duplicate of Claim 1.

As Applicants have canceled Claim 2, Applicants respectfully request that this rejection has been rendered moot.

REJECTION UNDER 35 U.C.S. § 102

The Official Action has rejected Claims 1-9 and 19 under 35 U.S.C. § 102 as being unpatentable over Shearer. The Official Action contends that Shearer discloses all of the Applicants' claim limitations. Applicants respectfully traverse the rejection.

Amended Claim 1 recites, *inter alia*, a multi-hop communication system having a radio control station, including:

. . . a control signal transmission/reception unit configured to transmit/receive a control signal having a lower bit rate than the information signal and for conducting communication with the radio station . . .

By way of background, multi-hop cellular networks are known in which communication between a cellular device and a cellular base station is via multiple hops of cellular devices; the multi-hop cellular devices act as relay stations to the cellular base station. Configuration of the multi-hop path is ideally performed with a minimum of control signals. Furthermore, the allocation of communication channels and the degree to which information, as well as control data, is transmitted over these available channels is a consideration for power consumption and network congestion.¹

In light of at least the above deficiencies in the art, the present invention is provided. With at least this object in mind, a brief comparison of the claimed invention, in view of the cited references, is believed to be in order.

Shearer describes a multi-hop wireless local area network (WLAN) system. The WLAN (20) includes a hub access point (HAP) node (22) and active nodes (24) and inactive nodes (26). The WLAN is configured as a daughter network, which is coupled to a parent

¹ Application at pages 1-2.

network (28), such as the internet.² Fig. 7 shows a high-level block diagram of a node used from the WLAN network. The node includes a processor (46), a transceiver (48), a memory (50), a timer (52), and a data port (54).³

In operation, the HAP schedules time slots (42) for active nodes along outward communication paths (34) and inward communication paths (36). Beginning time slots for the inward communication paths are assigned to outermost nodes (30). Likewise, beginning time slots for the outward communication paths are assigned to the hub access point node. In this manner, the transceiver (48) of an active node can engage in operations during an assigned time slot. The processor (46) controls the transceiver by specifying a transmit/receive direction of operation, a channel over which to communicate and when to communicate, and when to commence transmitting and receiving.⁴

Conversely, in an exemplary embodiment of the Applicants' invention, a multi-hop communication system is configured via a radio control station, which communicates with the radio stations that relay a signal transmitted from other radio stations. A radio control station includes a control signal transmission/reception unit. This unit transmits/receives a control signal having a lower bit rate than the information signal and conducts communication with the radio station.⁵ Shearer does not disclose or suggest a control signal transmission/reception unit, which transmits/receives a control signal having a lower bit rate than the information signal for conducting communications with a radio station, as recited in Applicants' amended Claim 1 or any claim depending therefrom. Likewise, independent Claims 3, 9, and 19 recite substantially similar limitations to that discussed above; and, as

² Shearer at paragraphs 41 through 42.

³ Shearer at paragraph 63; Fig. 7.

⁴ Shearer at paragraph 54; Abstract.

⁵ Application at page 7; Fig. 2A.

such, these claims and any claims depending therefrom are likewise allowable over the cited references.

Accordingly, Applicants respectfully request that the rejection of Claim 1-9 and 19 under 35 U.S.C. § 102 be withdrawn.

REJECTION UNDER 35 U.S.C. § 103

The Official Action has rejected Claims 10 and 11 under 35 U.S.C. § 103 as being unpatentable over Shearer and Haartsen. The Official Action states that Shearer discloses all of the Applicants' claim limitations, with the exception of a communication route determiner, which transmits a usage inquiry to a radio station for inquiring usage of a communication channel handled by the radio control station and transmitting/receiving the information signal according to a usage notification that is a response to the usage inquiry. The Official Action cites Haartsen as disclosing this more detailed aspect of the Applicants' invention and states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the cited references for arriving at the Applicants' claims. Applicants respectfully traverse the rejection.

As discussed above, Shearer does not suggest the elements of the Applicants' claims for which it is asserted, and Haartsen does not remedy the deficiency discussed above, Applicants respectfully submit that a *prima facie* case of obviousness has not been established.

Accordingly, Applicants respectfully request that the rejection of Claims 10 and 11 under 35 U.S.C. § 103 be withdrawn.

The Official Action has rejected Claim 12 under 35 U.S.C. § 103 as being unpatentable over Shearer in view of Haartsen and further in view of Chari. The Official Action asserts that Shearer and Haartsen disclose all of the Applicants' claim limitations,

with the exception of a radio station having a decision unit changing a threshold for the reception level according to a transmission speed of the information signal and deciding whether or not communication is directly conducted with the radio control station based on a result of comparison of the reception level and the threshold. The Official Action cites Chari as disclosing this more detailed aspect of the Applicants' invention and states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the cited references for arriving at the Applicants' claims. Applicants respectfully traverse the rejection.

As discussed above, Shearer does not suggest the elements of the Applicants' claims for which it is asserted, and Haartsen does not remedy the deficiency discussed above, Applicants respectfully submit that a *prima facie* case of obviousness has not been established. Chari does not remedy the deficiency discussed above.

Further, Applicants note that the beacon, which is broadcast in Chari, simply provides a server address, which is propagated through a network based upon the quality of links which are traversed by the beacon. In other words, at some point, it no longer becomes feasible to propagate the beacon due to link quality factors.⁶ The quality of the links between nodes on a network is clearly different from a threshold of a reception level of a control signal. Likewise, Applicants' Claim 12 recites changing the reception level of a control signal in accordance with a transmission speed of a separate signal, namely an information signal. There is no disclosure or suggestion in Chari for adjusting a reception level of one signal in accordance with the reception speed of a second signal. Thus, Claim 12 is allowable at least for these additional reasons.

⁶ Chari at column 3, lines 33-54.

Accordingly, Applicants respectfully request that the rejection of Claim 12 under 35 U.S.C. § 103 be withdrawn.

The Official Action has rejected Claims 13-18 under 35 U.S.C. § 103 as being unpatentable over Shearer in view of Chari. The Official Action states that Shearer discloses all of the Applicants' claim limitations, with the exception of a first relay controller for transmitting a relay control signal to another station for requesting a relay of an information signal and setting up a communication route to the radio control station via another station according to a response relay control signal. The Official Action cites Chari as disclosing this more detailed aspect of the Applicants' invention and states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the cite references for arriving at the Applicants' invention. Applicants respectfully traverse the rejection.

As discussed above, Shearer does not suggest the elements of the Applicants' claims for which it is asserted, and Chari does not remedy the deficiency discussed above, Applicants respectfully submit that a *prima facie* case of obviousness has not been established.⁷

Accordingly, Applicants respectfully request that the rejection of Claims 13-18 under 35 U.S.C. § 103 be withdrawn.

NEW CLAIMS

New Claims 20-22 recite more detailed aspects of the Applicants' invention, which are not disclosed or suggested by the cited references. Accordingly, Applicants respectfully submit that these claims are allowable over the cited references.

⁷ Further, Applicants note that Chari is further deficient for the teachings for which it has been asserted as discussed at page 11 of this response.

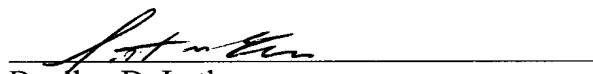
CONCLUSION

Consequently, in view of the foregoing amendment and remarks, it is respectfully submitted that the present Application, including Claims 1 and 3-22, is patently distinguished over the prior art, in condition for allowance, and such action is respectfully requested at an early date.

If the Examiner believes that any additional formal matters need to be addressed in order to place this Application in condition for allowance, the Examiner is respectfully requested to contact the undersigned by telephone at the Examiner's convenience.

Respectfully submitted,

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